WHAT IS CLAIMED IS:

1. A control system for a heating system including a combustion chamber, a thermostat, an ignitor, an air blower, and a fuel pump, the control system comprising:

at least one ultraviolet (UV) sensor to be positioned adjacent to a combustion flame source in the combustion chamber of a heating system for generating a UV detection signal indicative of the quality of the combustion flame based on the characteristics of UV light generated by the combustion flame; and

a monitoring circuit communicating with the at least one UV sensor for generating at least one signal in response to the UV detection signal.

2. A control system as defined in claim 1, wherein the at least one signal includes control signals for regulating the quality of the combustion flame.

3. A control system as defined in claim 2, wherein the control signals are for regulating the on and off operation of at least one of the ignitor, the fuel valve, the air blower and the fuel pump.

4. A control system as defined in claim 1, wherein the at least one UV sensor includes a sensing element having an electrical resistance which varies in a predetermined relationship to the intensity of lumens of a predetermined range of UV light frequencies that are emitted by the combustion flame.

5. A control system as defined in claim 4, wherein the relationship between the electrical resistance of the sensing element and the intensity of lumens emitted by the combustion flame correlates with the quality of the combustion flame based on the variation in the percentage of carbon dioxide present in the combustion product of the combustion flame.

6. A control system as defined in claim 4, wherein the predetermined range of UV light frequencies is from about 8.6×10^{14} Hz to about 12×10^{14} Hz.

7. A control system for a heating system including a combustion chamber, a thermostat, an ignitor, an air blower, and a fuel pump, the control system comprising:

at least one ultraviolet (UV) sensor to be positioned adjacent to a combustion flame source in the combustion chamber of a heating system for generating analog signals indicative of the quality of the combustion flame based on the characteristics of UV light generated by the combustion flame;

means communicating with the at least one UV sensor for converting the analog signals into digital signals indicative of the quality of the combustion flame based on the characteristics of UV light generated by the combustion flame; and

means for performing numerical and logical operations on the digital signals.

8. A control system as defined in claim 7, wherein the digital signals include control signals for regulating the quality of the combustion flame.

9. A control signal as defined in claim 8, wherein the control signals are for regulating the on and off operation of at least one of the ignitor, the fuel valve, the air blower and the fuel pump.

10. A control system as defined in claim 7, wherein the communicating means and the performing means is a microcontroller.

11. A control system as defined in claim 7, wherein the performing means includes determining from the digital signals the highest intensity frequencies of UV light generated by the combustion flame.

12. A control system as defined in claim 7, wherein the performing means includes determining from the digital signals the average intensity of UV light generated by the combustion flame.

13. A control system for a heating system including a combustion chamber, a thermostat, an ignitor, an air blower, and a fuel pump, the control system comprising:

at least one ultraviolet (UV) sensor to be positioned adjacent to a combustion flame source in the combustion chamber of a heating system for generating signals indicative of the quality of the combustion flame based on the characteristics of UV light generated by the combustion flame;

means for transmitting the signals to a remote processor via a global communications network; and

means at the remote processor for employing data carried by the transmitted signals to aid service personnel responsible for fuel delivery or heating system repair in servicing the heating system.

14. A control system as defined in claim 13, wherein the transmitting means includes a modem.

15. A control system as defined in claim 14, wherein the modem includes a hybrid DAA circuit for interfacing the modem to the global communications network.

16. A control system as defined in claim 13, wherein the data carried by the transmitted signals includes at least one of fuel valve on time, flame quality parameters, and exception to normal operation data requiring need for immediate service.

17. A control system as defined in claim 13, wherein the employing means includes using data carried by the transmitted signals in conjunction with non-transmitted data originating from the service personnel to determine fuel delivery dates.

18. A control system as defined in claim 17, wherein the non-transmitted data includes at least one of heating degree-day information, date of last fuel delivery, and modifier constants for each heating control system customer to fine-tune the prediction accuracy of fuel delivery dates based on the operational history for each customer.

19. A control system as defined in claim 16, wherein the flame quality parameters include at least one of highest intensity frequencies of UV light from the combustion flame, average intensity of UV light from the combustion flame, and the average exhaust gas stack temperature.

20. A control system as defined in claim 19, wherein the means for employing data includes analyzing the highest intensity frequencies of UV light from the combustion flame, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation.

21. A control system as defined in claim 19, wherein the means for employing data includes analyzing the highest intensity frequencies, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation to determine whether the percentage shift in values exceeds predetermined thresholds associated with less than optimal performance so as to require servicing at a predicted future date.

22. A control system as defined in claim 19, wherein the means for employing data includes analyzing the highest intensity frequencies, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation to determine whether the percentage shift in values exceeds predetermined thresholds associated with less than optimal performance so as to require servicing immediately, but without shutdown.

23. A control system as defined in claim 19, wherein the means for employing data includes analyzing the highest intensity frequencies, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation to determine whether the percentage shift in values exceeds predetermined thresholds associated with unacceptable performance requiring immediate shutdown.

24. A control system as defined in claim 19, wherein the means for employing data includes analyzing the highest intensity frequencies, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation for calculating the rate of change of the values to determine the next service date.

25. A control system as defined in claim 16, wherein the exception to normal operation data requiring the need for immediate service includes at least one of a lockout condition, the presence of combustion flame prior to start-up, and an indication from a control system self-diagnostic that the control system is faulty.

26. A method of controlling a heating system including a combustion chamber, a thermostat, an ignitor, an air blower, and a fuel pump, the method comprising the steps of:

positioning at least one ultraviolet (UV) sensor adjacent to a combustion flame source of a combustion chamber of a heating system;

generating detection signals from the at least one UV sensor indicative of the quality of the combustion flame based on the variation in the percentage of carbon dioxide present in the combustion product of the combustion flame; and

generating control signals in response to the UV signals for regulating the quality of the combustion flame.

27. A method as defined in claim 26, wherein the control signals are for regulating the on and off operation of at least one of the ignitor, the fuel valve, the air blower and the fuel pump.

28. A method as defined in claim 26, wherein the UV detection signals are based on the range of UV light frequencies in the range of about 8.6×10^{14} Hz to about 12×10^{14} Hz.

29. A method as defined in claim 26, further including the step of determining from the detection signals the highest intensity frequencies of UV light generated by the combustion flame.

30. A method as defined in claim 26, further including the step of determining from the detection signals the average intensity of UV light generated by the combustion flame.

31. A method as defined in claim 26, further including the steps of:

transmitting the detection signals to a remote processor via a global communications network; and

employing data carried by the transmitted signals to aid service personnel responsible for fuel delivery or heating system repair in servicing the heating system.

32. A method as defined in claim 31, wherein the data carried by the transmitted detection signals includes at least one of fuel valve on time, flame quality parameters, and exception to normal operation data requiring need for immediate service.

33. A method as defined in claim 31, wherein the step of employing data includes using data carried by the transmitted signals in conjunction with non-transmitted data originating from the service personnel to determine fuel delivery dates.

34. A method as defined in claim 33, wherein non-transmitted data includes at least one of heating degree-day information, date of last fuel delivery, and modifier constants for each heating control system customer to fine-tune the prediction accuracy of fuel delivery dates based on the operational history for each customer.

35. A method as defined in claim 32, wherein the flame quality parameters include at least one of highest intensity frequencies of UV light from the combustion flame, average light intensity of UV light from the combustion flame, and the average exhaust gas stack temperature.

36. A method as defined in claim 35, wherein the step of employing data includes analyzing the highest intensity frequencies of UV light from the combustion flame, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation.

37. A method as defined in claim 35, wherein the step of employing data includes analyzing the highest intensity frequencies, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation to determine whether the percentage shift in values exceeds predetermined thresholds associated with less than optimal performance so as to require servicing at a predicted future date.

38. A method as defined in claim 35, wherein the step of employing data includes analyzing the highest intensity frequencies, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation to determine whether the percentage shift in values exceeds predetermined thresholds associated with less than optimal performance so as to require servicing immediately, but without shutdown.

39. A method as defined in claim 35, wherein the step of employing data includes analyzing the highest intensity frequencies, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation to determine whether the percentage shift in values exceeds predetermined thresholds associated with unacceptable performance requiring immediate shutdown and immediate service.

40. A method as defined in claim 35, wherein the step of employing data includes analyzing the highest intensity frequencies, the average flame intensity, and the exhaust gas stack temperature for the percentage shift in values from optimal respective frequencies, intensity, or temperature as established during the previous servicing operation for calculating the rate of change of the values to determine the next service date.

41. A method as defined in claim 32, wherein the exception to normal operation data requiring need for immediate service includes at least one of a lockout condition, the presence of combustion flame prior to start-up, an indication from a control system self-diagnostic that the control system is faulty, and an indication that a flame quality or stack temperature threshold has been reached that does not require shutdown, but does require immediate service.